SYMONS'S

MONTHLY

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METEOROLOGY IN ROUMANIA.*

IN our number for July, 1886, we noticed three of the earliest publications by Prof. Hepites, who has from the first been Director of the Meteorological Institute of Roumania. In that notice by-the-bye, there was a remark quite unconnected with meteorology to which we may perhaps be excused for referring. By direction of the Roumanian Minister for Agriculture, Prof. Hepites had made a long tour, and studied the meteorological organizations of Europe. To this we added as a foot note, "Roumania has a Minister for Agriculture, England has not yet reached such a state of advancement." Roumania had the start. England has appointed one since we wrote. We shall watch with interest their relative progress.

In the first place we must thank Prof. Hepites for printing most of his text in French as well as in Roumanian, it is more than a convenience, it is a necessity for most of the inhabitants of western Europe.

In the preface to Vol. I., Prof. Hepites points out the scarcity of old observations in Roumania, and that, therefore, his Institute has practically no averages with which to compare results; has in fact to begin absolutely *de novo*.

He wisely begins with a long and apparently complete list of notices of observations and remarks on the climate of the country, which though fragmentary were well worth collecting. To this follows a list of books, memoirs and printed notes on, or appertaining to, meteorology which have appeared in Roumania, the most remarkable feature in which is the fact that there is not one paper before 1841, and that is apparently a physical rather than a meteorological one, viz., "Asaki, Le thermomètre ou le mesureur de

* *Studiŭ aspra Climeĭ Bucurestilor in Aniĭ*, 1885–88, de Stephan C. Hepites, Directorul Institutuluĭ Meteorologic. Partea I., Temperatura aerluĭ.—Buckharest-Tipografia Academiei, Române, 1889. 4to 72 pages, 3 plates.

Annales de l'Institut Météorologique de Roumanie. Par Stephan C Hepites.—Tomes I.–III. Bucuresci, F. Göbl Fïu, 1886–89. 4to, about 600 pages each.

chaleur," published in the Icoana Lumei at Iassy, in 1841. The Institute is rapidly forming a good library, and prints very handsomely its list of books received.

Part II. of Vol. I., consists of 47, 4 to pages, describing the instruments at the Institute and how they are used. Prof. Hepites recognizing the fact that few Roumanians are acquainted with meteorological instruments has described them very fully, and illustrated his description by several excellent engravings. In his description of the pattern of barometer adopted by the Hamburg Seewarte (and which is much the same as our "Kew pattern"). Prof. Hepites ascribes the air trap to Bunten, not as is usual to Gay Lussac, and Prof. Hepites is right. Gay Lussac's barometers had no air trap, Bunten, who succeeded Mossy as an optician at 26, Quai Pelletier, Paris, invented the air trap, and showed it at the *Exposition des produits de l'Industrie Francaise*, in 1823, and having supplied barometers so trapped to various experienced men—Humboldt, Arago and others received from them the highest praise. Acting upon this information, Mr. Ellis in his valuable history of the barometer,* has already pointed out Bunten's claims, but it takes a long time to correct a widespread error.

Of thermometer stands Prof. Hepites has a large collection, oddly enough although Kew Observatory has long abandoned its old pattern (large enough for a hermit to dwell in) Prof. Hepites has one out at Buckharest.†

There is one respect in which Prof. Hepites could render very valuable service to meteorology, at little cost either of time or of trouble. He has three instruments for measuring evaporation, Piche's moistened paper, Wild's counterpoised dish, and a modification of Wild's, whereby it is made self-recording. No maker's name is given, but it looks as if it had been made by Hottinger. All these evaporators are in the Kew stand. We should be very glad if Prof. Hepites would have a large tank made like those used in the South of France, or the iron one formerly at Strathfield Turgiss, and now at Camden Square. A comparison of its results with those of Piche and of Wild, in a climate like that of Buckharest, would be extremely interesting, and of much importance to engineers.

We conclude our notice of this volume by extracting a few data for 1885 :—

Temperature.—True mean 50°·6; mean $\left(\frac{M+m}{2}\right)$ 51°·8. Absolute max. 97°·7; min. −5°·1.
Humidity.—Mean 76. Max. 100. Min. 25.
Rain.—Total 25·49 in. on 112 days. Max. fall 2·26 in. on June 21st.
Evaporation.—Total 13·87. Sunshine 1896 hours, or 42 per cent.

Tome II. is somewhat similar to Tome I., it reports the history of

* *Quar. Jour. Roy. Met. Soc.*, vol. xii., 1886, p, 138.
† Compare his engraving in vol. i., p. cx. with that of the Kew stand in *Met. Mag.*, vol. iv., 1869, p. 17.

the Institute for the year, then gives as full an account of the climate of Buckharest as can be compiled, and finishes with the observations in extenso for 1886, of these we take the same details as we have just given for 1885 :—

Temperature.—True mean 50°·7; mean $\left(\frac{M+m}{2}\right)$ 51°·1. Absolute max. 91·4; min. 11·1.
Humidity.—Mean 74. Max. 100. Min. 26.
Rain.—Total 29·34 in. on 109 days. Max. fall 2·38 on June 9th.
Evaporation.—Total 12·81 in. Sunshine 1980 hours, or 45 per cent.

We own to disappointment when we found that Tome III. was like unto Tome I. and II., very good and valuable, but wholly devoted to the Buckharest observations. Prof. Hepites has evidently a very hard struggle to obtain funds—the Roumanians are like all Europeans, willing to spend money on buildings and on instruments, but not willing to pay for brains, not willing to spend money in order to utilize the observations that are made. It is an old, old story, it is sheer waste of money and of energy to equip stations and not fully utilize the records they afford. We wonder that when the erection of a mountain observatory was proposed, Prof. Hepites did not at once say—"No, let us first get our existing system in full work, let us have the funds to reduce and publish the observations already made, and *then* we will see about the station on the Vîrful cu Dor." However, it is his business not ours, but we would have no costly new instruments, no new observatories, and not even publish any more Buckharest returns, until we had done justice to the observers throughout Roumania, by working up their returns for 1885–86 and 87.

THE MARCH FROST.

WE hope that a frost greater than has occurred in March for nearly half a century, will be fully described. We can here only give a few notes just as they have arrived:—

CAMDEN SQUARE :—

	Glaisher Stand.			Stevenson Screen.		Grass.
	Max.	Min.	9 a.m.	Max.	Min.	Min.
March 4...	40·8	15·6	20·4	41·1	18·0	12·8

Since 1859, there are only four instances of the min. on the Glaisher stand falling below 22°, viz.—

1862—March 4th	21·3
1874—March 11th	21·9
1889—March 4th	19·2
1890—March 4th	15·6

The average minimum during the 30 years, 1859 to 1888, was 25°·5, so that the above is not only by far the lowest, but nearly 10° below the average.—*G. J. Symons.*

INGLESIDE, KENLEY.—Since March came in we have had a remarkable spell of cold.

	Max. deg.	Min. deg.	Min. on grass. deg.
March 1	36·5	25	19
,, 2	29·0	24	snowed up
,, 3	29·0	20	,, ,,
,, 4	39·0	6	2
,, 5	46·0	29	27

You will thus see that we registered on March 4th the low temperature of 6°, and on the grass 2°; and on the 5th the max. was 46°, a variation of 40° in two days. On two days the ther. never rose above 29°.—*Harold Smith.*

HARTLEY, CRANBROOK.—Lowest temp. in March for 25 years.

Year.	deg.	Date.	Year.	deg.	Date.
1866...	24	1	1878...	20	25
1867...	23	17	1879...	27	25
1868...	28	25	1880...	26	29
1869...	25	4, 8	1881...	22	1
1870...	20	14	1882...	27	22
1871...	29	15	1883...	23	10, 11
1872...	26	21, 22	1884...	31	1, 3
1873...	27	1, 14	1885...	30	8, 10, 23, 25, 26
1874...	19	11	1886...	22	11
1875 ..	25	19	1887...	21	13
1876...	24	19	1888...	20	1
1877...	21	1	1889...	20	4

1890, 10° on 4th.

George Pile.

TENTERDEN.—We have had frequent S here, but very light; 5 inches deep last night (3rd) only gave ·25 in. Excessively low temp. this morning (4th), 14° on stand, and 20° at 9 a.m. I see nothing like so low as 14° even in March, 1883, or March, 1886.—*J. Ellis Mace.*

FOX GROVE, BECKENHAM.—On the morning of the 4th inst. my thermometer on an improved Glaisher stand registered a minimum of 7°·3, the correctness of the record being confirmed by a neighbour's reading of 7°·0, about 300 yards away. This temperature is not only remarkable in itself, but the more so as marking the fourth consecutive year's severe frost in March. In 1887 there was skating in London as late as March 21st, and at the club rink in the Regent's Park there was skating till March 5th (inclusive) in 1888, on March 6th, 1889, and on March 4th and 5th, 1890.—*Percy Bicknell.*

ROYAL OBSERVATORY GREENWICH :—

March 4th—Max. 35°·0; min. 13°·1; min. on grass 8°·6.

The minimum (13°·1), is the lowest that has been recorded in the month of March, since 1845, March 13th, when also 13°·1 was registered.—*The Astronomer Royal.*

FOREST LODGE, MARESFIELD.—Before sunrise yesterday morning

4th) the radiation thermometer fell to 8° and this *beneath a coating of snow.* Had the bulb been clear, it must have gone lower. It is a standard instrument.—*William Noble.*

THE OBSERVATORY, CROWBOROUGH CROSS.—

	March 3.		March 4.
Min. in shade	15°·8	.....	16°·2
,, in the open	13°·7	.....	12°·0
,, on grass	9°·6	.....	8°·7

I have not yet had time to examine past records, but I believe it to be the lowest temperature in March since 1845. (Max. in screen on 2nd only 28° !) Snow on 3rd seven inches on the level, nearly the whole of which fell in the afternoon of the 2nd—a regular blizzard. —*C. L. Prince.*

LANGTON HERRING, WEYMOUTH.—

March 3.—Min. temp. 21°, 9 a.m. 25°, 11 a.m. 27°, max. 32°
4 ,, 20° ,, 25° ,, 28°, 2.30 p.m. 32°

The minima of both days are lower than any previously recorded in March since January, 1881, and only once has a min. of 20° been recorded, viz., on February 25th, 1888. Solar halos were observed on both days.—*C. H. Gosset.*

SNOW STORM, MARCH 9TH.

To the Editor of the Meteorological Magazine.

SIR,—At 8.55 this morning, with a temperature of 32°, wind blowing from N.W. by N., snow of extreme fineness and dryness commenced to fall. The storm lasted till 9.5 a.m. I measured the depth in several places on a flat gravel walk not exposed to the wind, and found it to be exactly 1½ inches. I then measured the snow which had accumulated in the rim of my rain gauge, and it yielded ·12 in. of water, being practically one-twelfth part. The snow rapidly disappeared in the hot sunshine which followed the storm.

JAS. WATKINS.

Hurst Bank, Heaton, Bolton, March 7th, 1890.

[Old readers of this magazine may be amused at the above in illustration of some articles in our early numbers on "Periodic Snowballs on March 8th." On March 8th, this year, we had snow, hail and thunder in South Yorkshire, and there were several slight showers of soft hail and of snow in London on the 9th.—ED.]

SALT IN HAIL.

To the Editor of the Meteorological Magazine.

SIR,—Some years ago, in the course of a search for traces of Krakatoa dust in the atmosphere, examining microscopically the spot on a slip of glass where a hailstone had melted and dried up, I found a few minute crystals of chloride of sodium.

GEORGE F. BURDER, M.D.

Clifton, February 28th, 1890.

ROYAL METEOROLOGICAL SOCIETY.

THE usual monthly meeting of this Society was held on February 19th at the Institution of Civil Engineers, 25, Great George Street, Westminster.

Mr. O. B. Cuviljé, Mr. W. Harpur, M.Inst. C.E., and Mr. H. J. Spooner, F.G.S., were elected Fellows of the Society.

The following papers were read, viz. :—

1. "Observations on the Motion of Dust, as Illustrative of the Circulation of the Atmosphere, and of the Development of Certain Cloud Forms," by the Hon. Ralph Abercromby, F.R.Met.Soc. The author has made numerous observations on the motion of dust in various parts of the world, especially on the deserts on the West Coast of South America. He finds that the wind sometimes blows dust into streaks or lines, which are analagous to fibrous or hairy cirrus clouds; sometimes into transverse ridges and furrows, like solid waves, which are analagous to certain kinds of fleecy cirro-cumulus cloud; sometimes into crescent-shaped heaps with their convex side to the wind, which are perhaps analagous to a rare cloud form called "mackerel scales;" sometimes into whirlwinds, of at least two, if not of three, varieties, all of which present some analogies to atmospheric cyclones; sometimes into simple rising clouds, without any rotation, which are analagous to simple cumulus-topped squalls; and sometimes into forms intermediate between the whirlwind and simple rising cloud, some of which reproduce in a remarkable manner the combination of rounded, flat, and hairy clouds that are built up over certain types of squalls and showers. Excessive heating of the soil alone does not generate whirlwinds; they require a certain amount of wind from other causes to be moving at the time. The general conclusion is that when the air is in more or less rapid motion from cyclonic or other causes, small eddies of various kinds are formed, and that they develop the different sorts of gusts, showers, squalls, and whirlwinds.

2. "Cloud Nomenclature," by Captain D. Wilson-Barker, F.R.Met.Soc. The author proposes a simple division of cloud forms under two heads, viz., Cumulus and Stratus, and recommends that a more elaborate and complete division should be made of these two types. In support of this proposal photographs of clouds were exhibited on the screen.

3. "An Optical Feature of the Lightning Flash," by E. S. Bruce, M.A., F.R.Met.Soc. It has been stated in the Report of the Thunderstorm Committee of the Royal Meteorological Society that there is not the slightest evidence in the photographs of lightning flashes of the angular zigzag or forked forms commonly seen in pictures. The author, however, believes that this is an optical reality, as the clouds on which the projection of the flash is cast are often of the cumulus type, which afford an angular surface. In support of this theory he exhibited some lantern slides of lightning playing over clouds.

REMARKABLY DRY AIR.

To the Editor of the Meteorological Magazine.

SIR,—The following instances, observed here by myself, may be thought worthy of being added to your list :—

	Dry.	Wet.	Diff.	Humidity.
1870, July 24, 3 p.m.	89·7	63·8	25·9	23
1886, March 9, 5.45 p.m....	36·7	28·7	8·0	43

The readings were taken on an open stand (Glaisher's). The humidities were got from Glaisher's Hygrometric Tables, 2nd edition, the number 23 being approximate only, from defect of the table.

July 24th, 1870, was a day of intense heat (max. 91°·3), with a cloudless sky and a fresh breeze, varying between south-east and east.

March 9th, 1886, was very fine, but cold, with a gale from south-east, inclining at times towards south.

In my experience it has always been the case that extreme dryness of air has been associated with considerable strength of wind, and thus the question is raised as to how far the calculated relative humidity can be relied on for indicating that which it professes to indicate. It may even be a question whether, from some points of view, the bare difference between the dry and wet bulbs does not constitute a more valuable record than the calculated humidity. Certainly nothing can more accurately represent the *drying power* of the air, for the difference between the bulbs is the direct measure of the rapidity of evaporation.

The tables used by Col. Ward must, I think, differ materially from Glaisher's. At least, I cannot with Glaisher's tables bring out from Col. Ward's data humidities at all harmonising with those which he gives for his extreme instances.

GEORGE F. BURDER, M.D.

Clifton, February 28th, 1890.

"AREAS OF RAREFACTION" OR "DEPRESSIONS."

To the Editor of the Meteorological Magazine.

SIR,—The late Dean Hook, who had a habit of soliloquizing aloud, being present at a service where the second lesson, which happened to be taken from the Epistle to the Hebrews, was given out by the reader as such a chapter from the Epistle of St. Paul to the Hebrews, said to himself, but in a voice that was quite audible to those near him, "So you have settled *that* question have you, old fellow?" The question alluded to by the Dean being of course, the much disputed one as to the authorship of the Epistle to the Hebrews.

I hope your correspondent, Dr. Muirhead, will not think me disrespectful if I say that a similar exclamation to that of the humorous Dean rose to my lips as I read his off-hand assertion that areas of

low pressure are areas "where the air is more rarified, and therefore lighter (not *depressed* as our meteorological authorities teach the general public day-by-day)."

Now this assertion of Dr. Muirhead's is probably true in regard to some of the minor inequalities of atmospheric pressure such as those to which he is chiefly referring in his letter, but, when made in the broad and sweeping way in which he has stated it in the words I have quoted, it seems to me to be a sheer paradox. Does he seriously maintain that the great gyrating low pressure systems which come to us from the Atlantic, *e.g.*, can be reasonably explained on any other theory than that of the existence of eddy like depressions in the atmospheric ocean?

Has he ever stood by the side of a stream and noticed the little "depressions" on the surface of the water where some obstacle to the even flow of the stream has given rise to a conflict of currents? And if so, has it not occurred to him that the conflict of the great atmospheric currents produced by the uneven distribution of the solar heat must inevitably give rise to similar eddy-like depressions in the atmosphere (cyclones) as well as to areas where the atmosphere is, so to speak, piled up (anticyclones). That, at any rate, appears to be the view taken by most leading meteorologists, and, though it may have its difficulties, is not to be set aside by a mere wave of the hand. If Dr. Muirhead will give us good and sufficient reasons for rejecting it, it must, of course, be abandoned; but at present it holds the field, and the burden of disproof lies with our opponents. I, for one, should like much to hear anything that can be fairly urged against it.

You, Sir, recently undertook to demonstrate the non existence of thunderbolts, and in the opinion of most, if not all of your hearers, thoroughly succeeded in doing so. I am sure you will not deny to Dr. Muirhead the opportunity of demonstrating in your columns if he can, the non-existence of those atmospheric depressions which have so long haunted the too imaginative minds of Mr. Scott and his colleagues of the Meteorological Office.

G. T. RYVES, F.R. Met. Soc.

Tean Vicarage, Stoke-on-Trent, March 6th, 1890.

REVIEWS.

Strathpeffer Spa, its climate and waters, with observations historical, medical, and general, descriptive of the vicinity. By FORTESCUE FOX, M.D. London, H. K. Lewis, 1889. 8vo. xviii., 166 pages, map and photo lithographs.

IT is quite refreshing to have a new work on a British Health Resort. Some day we suppose it will become fashionable to be acquainted with the character, and beauty of our own country, and the time may come when people will believe that it is as possible to

find strong mineral water and pure air in the British Isles, as in France, Germany or Hungary.

Meanwhile Dr. Fortescue Fox has produced an interesting and useful monograph on the rising Spa of the far North—for it is very far North—a little N.W. of Inverness; but let it not be supposed that, therefore, Strathpeffer is a mere series of cottages on a hill side—the photographs show quite the contrary—but though there are four or five hotels, we should hardly recommend any one to follow Dr. Fox's advice, and take the 8 p.m. train from King's Cross, so as to reach Strathpeffer for lunch the next day, without *previously* ascertaining that there was a vacant room. Here, however, we have to deal only with the climate, and so we refer our readers for the history of the place, of the strength of its cold sulphur water, of the scenery, antiquities, &c., to the book itself, and proceed to epitomize the 20 pages or so devoted to its climate. This section is not written by Dr. Fortescue Fox, but by a relative to whom he refers as more "competent than myself." The first paragraph that we notice certainly does not justify praise, for either the writer wrote nonsense or the printer made nonsense of what he wrote, and the writer did not find it out. Here is the sentence :—

"Contrary to natural expectations, the Strathpeffer summer is much cooler than in the south of Britain, while, strange as it seems the average winter temperature is very little lower than that of the neighbourhood of London, and some of the winter months have even been slightly warmer."

The facts here are all right; but what do the first four words mean? Would any one naturally expect the summer to be hotter 400 miles nearer the Arctic circle than in London itself? Happily this is the only paragraph to which we need object, the bulk of the article is good, the writer hits the dominating influence when he says that the mountain ranges to the west extract much of the rain from the vapour laden westerly wind, thus giving Strathpeffer a dry and pleasant climate. That influence prevails from Perthshire, through the whole N.E. of Scotland, it is it which gives the crispness and brilliancy to the air of Braemar, and it is it partly which doubtless justifies the following paragraphs respecting Strathpeffer.

"The *Summers* are decidedly cooler than in the south of England, but they are bright, breezy and dry, especially in June and August. the long days invite to an open air life and vigorous exercise, which can be enjoyed without the enervating effect of the heat that is found so trying in many parts of England and on the continent. There is also the advantage of a pure ozoniferous mountain air."

"We have seen that the *Winters* are on the average a little colder than in the neighbourhood of London, but that the nights at least are often warmer. Moreover, the days are not spoiled by the fogs and mists so often met with in the south of England; and the rain clouds have a knack of clearing off readily, so that frequent spells of

sunshine, such as are hardly known in London, make walking a delight, even though the ground may be carpeted with crisp snow."

Dr. Fortescue Fox has been keeping careful meteorological records for four years, he has recently been adding to his instruments, and we believe so placing them that the results will be rigorously comparable with those at other stations, and we wish him success, not only in his meteorological, but in his medical work.

A popular treatise on the winds: comprising the general motions of the atmosphere, monsoons, cyclones, tornadoes, waterspouts, hailstorms, &c. By W. FERREL, M.A. Ph. D. New York, Wiley & Sons; London, Trübner & Co., 1889. 8vo. viii.,—506 pages.

IN writing this important work Prof. Ferrel has conferred a benefit on meteorologists. His mastery of mathematical methods is such that hitherto his publications have been beyond the comprehension of many, who would have profited by his instruction had it been conveyed in a manner which they could understand. The author has recognised this difficulty, and done his best to meet it. The result is a very valuable work treating fully all the subjects named in the title, Opinions will differ as to whether even now the title "popular" is strictly applicable, but however widely they may differ as to that, they will agree as to the value and importance of the information conveyed. And when Prof. Ferrel brings records of facts in illustration of his theories—no novelist or dramatist would compare with him for thrilling effect. Here for instance is one item in an account of a tornado :—

"At a farm house about 16 miles N.E. of Sunk Rapids, a wedding party of 30 persons was assembled, the ceremony was just concluded when the house was struck by the tornado. The bridegroom was killed outright, as were also 15 others; seven more victims of the catastrophe have since died, and only one of the company escaped severe injury."

Or take another case :—

"The house [probably of wood, Ed. *M.M.*] of Robert Reed, 16 ft. × 24 ft., and one-and-a-half stories high, was lifted up as easily as a feather, and without, at first, cracking the timber. So quickly was it done, that before Mr. Reed, who was within, knew his danger, the building had risen the height of 25 ft. or more. The house being then enveloped in darkness, and not knowing what had happened, he started for the door, thinking it time to make good his escape, when, instead of stepping out upon the ground as he expected, he fell the above distance, injuring himself severely."

But we must not let these thrilling stories lead us away from the main features of the book. It is very well arranged, starts with two introductory chapters (I.) On the Constitution and Nature of the Atmosphere, and (II.) on the Motions of bodies relative to the

earth's surface. The general circulation of the atmosphere is then considered, the influence of the earth's rotation and of the temperature of its surface being fully examined, as well as the influence of the circulation of the air on barometric pressure, rain and climate. Then follows consideration of monsoons, cyclones, and local winds, such as Pamperos, Mistral, Bora, &c.

Tornadoes receive a long chapter to themselves, and it is doubtful whether this could have been as well done by any one else. There are others, notably Lieut. Finley, who are more familiar with the damage, but we have never seen anything like the masterly way in which their mechanical effects are reduced to measurement, and shown to be in accordance with the known laws of matter. The study of tornadoes leads naturally to hail, thunder, and dust, storms, so that the book takes altogether a wide field.

As regards the formation of hail, while we have no serious objection to raise to the theory adopted by Prof. Ferrel, we think that some indication that his statements are theory and not facts, would have been an improvement. The subject is very difficult, many explanations have been suggested, and alth. gh very probably the theory given on p. 423 is correct, it is rather forcing the matter to put the whole process in the affirmative way there adopted.

Some persons find it difficult to believe that water ever falls on the earth in a solid stream, they say "Oh, no—you mean very heavy rain," but that is *not* what is meant. Even in this country we have heard the term "Cloud breaking," and "Breaking of a cloud," and Prof. Ferrel has a very interesting section on the subject, entitled "Cloud bursts," in which he adopts precisely the view we have always held as to the facts, and proceeds not merely to quote instances, but to show that theory is quite competent to explain how and why they happen.

The author uses all kinds of measures, English and metric haphazard, and frequently changes backwards and forwards in one sentence. Miles per hour into metres per second, Barometric gradients of English inches per English miles, suddenly given as millimetres and so on. No doubt it is perfectly clear to the author, but it would save trouble to those for whom the work is intended, if one series was adopted throughout. As regards temperatures, some are in Fahrenheit, some in Centigrade, and some are not marked either F. or C., so that one has to gather which they are by examining the context.

This, however, is the only fault that we have to find with a substantial and valuable work.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, AUGUST, 1889.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute.				Average.				Absolute.		TotalRain.		Aver.
	Maximum.		Minimum.										
	Temp.	Date.	Temp.	Date.	Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	Cloud.
	°		°		°	°	°	0–100	°	°	inches		0–10
England, London	84·4	1	44·2	25	70·5	52·6	52·7	75	125·9	40·2	1·80	16	5·7
Malta	100·0	10	64·2	30	88·0	69·9	64·9	65	147·6	58·2	·00	0	0·3
Cape of Good Hope.	80·0	24	32·4	2	63·7	47·0	...	...	...	...	5·00	7	5·3
Mauritius	76·0	30	61·4	16	73·6	64·3	58·3	71	125·6	52·5	3·68	22	5·5
Calcutta	89·9	2, 4	74·4	8	87·2	78·3	79·0	88	155·7	74·6	8·03	27	7·9
Bombay	87·7	4	75·5	7	84·9	77·8	76·2	84	139·7	74·7	10·32	31	8·8
Ceylon, Colombo	87 0	17	73·4	31	85·0	77·9	72·3	78	145·1	72·0	4·66	14	7·3
Melbourne	68·0	28	32·1	3	57·8	43·0	42·3	75	127·3	23·4	2·06	15	6·1
Adelaide	71·3	28	38·0	23	60·2	46·0	45·1	74	128·3	29·2	3·59	20	5·1
Wellington	62·0	14	35·0	19	54·8	41·7	40·3	75	110·0	25·0	2·59	15	3·7
Auckland	62·5	24	40·0	19	57·9	46·6	46·0	80	133·0	30·0	2·59	18	6·0
Jamaica, Kingston	93·5	4	69·3	10	91·1	72·1	71·9	72	...	...	2·02	...	...
Trinidad	91·0	8	70·0	var.	89·8	71·3	77·9	81	158·0	61·0	11·73	24	...
Toronto	83 9	21	45·8	6	75·4	56·1	56·3	74	...	39·0	·43	10	5·2
New Brunswick, Fredericton	84·7	30	43·0	14	74·5	54·4	57·1	76	...	...	1·82	12	4·9
Manitoba, Winnipeg	96·6	30	33·8	4	80·3	50·8	56·1	71	...	...	·95	10	5·4
British Columbia, Victoria	77·0	11	41·0	20	69·0	48·3	...	...	...	...	1·04	6	...

REMARKS, AUGUST, 1889.

MALTA.—Mean temp. 77°·9; mean hourly velocity of wind 6·9 miles. The sea temp. fell from 79°·5 to 77°·0. Averrge amount of cloud unusually low. J. SCOLES.

Mauritius.—Mean temp. of air 0°·4, and of dew point 0°·8 below, R 1·61 in. above, their respective averages. Mean hourly velocity of wind 13·0 miles, or 0·6 miles above average; extremes 27·2 on 20th, and 1·6 on 8th. Prevailing direction E.S.E. C. MELDRUM, F.R.S.

Melbourne.—Mean temp. of air 0°·2 below, of dew point 0°·2 above, humidity 1 above, and R ·23 in. above average. Prevailing winds N., strong on 8 days. Heavy dews on 10 days; fogs on 5 days; hoar frost on 2 days; hail on 2 days; T and L on the 11th. R. L. J. ELLERY, F.R.S.

Adelaide.—Pressure about normal. Mean temp. 0°·9 below the average. R 1·25 in. above the average, bringing the total for the year up to 23·32 in., the greatest on record during that period, and 1·03 in. above the total for the first 8 months of 1875, the previous highest record. C. TODD, F.R.S.

Wellington.—Heavy R on 3rd (1·15 in.), otherwise fine up to the 8th; from 9th to 18th generally showery; from 19th to the end pleasant weather, except on the night of 22nd, which was wet, with strong N.W. wind. Prevailing wind N.W., strong on 5 days. T on 14th, H on 14th. R half the average; mean temp. 0°·3 above average. R B. GORE.

Auckland.—On the whole a fine, mild and seasonable month. Mean temp. the same as the average; R small, being 1¾ in. under the average. T. F. CHEESEMAN.

SUPPLEMENTARY TABLE OF RAINFALL, FEBRUARY, 1890.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in			in.
II.	Dorking, Abinger Hall.	1·08	XI.	Castle Malgwyn	1·13
,,	Margate, Birchington...	·88	,,	Builth(Llanwrtyd Wells)	1·08
,,	Littlehampton	1·36	,,	Rhayader, Nantgwillt..	1·54
,,	Hailsham	1·20	,,	Carno, Tybrith	·59
,,	Ryde, Thornbrough	1·08	,,	Corwen, Rhug	·81
,,	Alton, Ashdell.....	·67	,,	I. of Man, Douglas	1·82
III.	Oxford, Magdalen Col...	·71	XII.	Stoneykirk, Ardwell Ho.	1·94
,,	Banbury, Bloxham	·61	,,	New Galloway, Glenlee	·97
,,	Northampton	·72	,,	Melrose, Abbey Gate...	·88
,,	Cambridge (Fulbourne).	·82	XIII.	N. Esk Res. [Penicuick]	·90
,,	Wisbech, Bank House..	·67	XIV.	Ballantrae, Glendrishaig	1·53
IV.	Southend	1·08	,,	Glasgow, Queen's Park.	·50
,,	Harlow, Sheering	·73	XV.	Islay, Gruinart School..	1·03
,,	Rendlesham Hall	·82	XVI.	Dollar.....	1·11
,,	Diss	1·06	,,	Balquhidder, Stronvar..	1·51
,,	Swaffham	·68	,,	Dunkeld, Inver Braan..	1·44
V.	Salisbury, Alderbury...	·73	,,	Dalnaspidal H.R.S. ...	2·07
,,	Warminster	·87	,,	Arbroath Cemetery.....	...
,,	Bishop's Cannings	·73	XVII.	Keith H.R.S.	1·10
,,	Ashburton, Holne Vic....	2·37	,,	Forres H.R.S.	·40
,,	Hatherleigh, Winsford.	·37	XVIII.	Fearn, Lower Pitkerrie.	·69
,,	Lynmouth, Glenthorne.	1·26	,,	Loch Shiel, Glenaladale	2·22
,,	Probus, Lamellyn	1·51	,,	N. Uist. Loch Maddy ...	·40
,,	Launceston, S. Petherwin	1·43	,,	Invergarry	1·18
,,	Wincanton, Stowell Rec.	·75	,,	Aviemore H.R.S.	·45
,,	Taunton, Lydeard Ho...	1·29	,,	Loch Ness, Drumnadrochit	·58
,,	Wells, Westbury	1·04	XIX.	Lairg H.R.S.	..
VI.	Bristol, Clifton	·58	,,	Scourie	·89
,,	Ross	·68	,,	Watten H.R.S.	1·17
,,	Wem, Clive Vicarage ...	·70	XX.	Dunmanway, Coolkelure	3·40
,,	Cheadle, The Heath Ho.	·65	,,	Fermoy, Gas Works ...	3·36
,,	Worcester, Diglis Lock	·51	,,	Tipperary, Henry Street	2·88
,,	Coventry, Coundon	·71	,,	Limerick, Kilcornan ...	...
VII.	Ketton Hall [Stamford]	1·10	,,	Miltown Malbay.....	2·60
,,	Grantham, Stainby	1·02	XXI.	Gorey, Courtown House	1·14
,,	Horncastle, Bucknall ...	1·08	,,	Navan, Balrath	·89
,,	Mansfield	·90	,,	Mullingar, Belvedere ...	1·05
VIII.	Neston, Hinderton	·65	,,	Athlone, Twyford	1·02
,,	Knutsford, Heathside ...	·64	,,	Longford, Currygrane...	1·05
,,	Lancaster, South Road.	·74	XXII.	Galway, Queen's Coll...	·95
,,	Broughton-in-Furness ..	1·26	,,	Clifden, Kylemore	2·18
IX.	Wakefield Prison	1·00	,,	Crossmolina, Enniscoe..	·53
,,	Ripon, Mickley	·98	,,	Collooney, Markree Obs.	·46
,,	Scarborough, West Bank	1·97	,,	Ballinamore, Lawderdale	...
,,	East Layton [Darlington]	·99	XXIII.	Warrenpoint	1·71
,,	Middleton, Mickleton..	·83	,,	Seaforde	1·66
X.	Haltwhistle, Unthank..	1·26	,,	Belfast, New Barnsley..	1·53
,,	Shap, Copy Hill	1·16	,,	Bushmills, Dundarave...	1·05
XI.	Llanfrechfa Grange	·58	,,	Stewartstown	1·38
,,	Llandovery	1·06	,,	Buncrana	1·03

FEBRUARY, 1890.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average. 1880–9	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE Max. Deg.	Max. Date	Min. Deg.	Min. Date	No. of Nights below 32° In shade.	On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	1·05	— ·83	·66	14	9	49·3	1	27·1	28	11	
II.		Maidstone (Hunton Court)...	·92	— ·88	·55	14	5	...	...	...	...	...	...
,,		Strathfield Turgiss	1·10	— ·90	·61	14	8	50·7	18	24·8	4	15	24
III.		Hitchin	·73	— 1·02	·31	14	9	51·0	1	27·0	10*c*	16	...
,,		Winslow (Addington)	·77	— 1·39	·34	15	8	50·0	1	24·0	13	14	20
IV.		Bury St. Edmunds (Westley)	1·02	— ·54	·42	15	7	...	...	...	...	...	...
,,		Norwich (Cossey)	·64	— ·95	·26	14	5	...	...	...	...	...	...
V.		Weymouth(LangtonHerring)	·76	— 1·84	·17	14	7	50·0	17	26·0	28	13	...
,,		Barnstaple	1·02	— 2·04	·31	19	7	53·0	22*b*	26·0	3, 4	...	...
,,		Bodmin (Fore Street)	1·71	— 3·28	1·20	16	10	...	...	...	...	...	...
VI.		Stroud (Upfield)	·68	— 1·87	·22	15	6	50·0	1	25·0	12*d*	15	...
,,		ChurchStretton(Woolstaston)	·84	— 1·61	·28	14	12	50·0	21	24·0	13*e*	16	22
,,		Tenbury (Orleton)	·74	— 1·74	·20	15	12	53·0	25	22·2	11	16	19
VII.		Leicester (Barkby)	·84	...	·44	15	11	51·0	1	21·0	5	19	27
,,		Boston	1·15	— ·53	·65	15	9	55·0	23	24·0	28	12	...
,,		Hesley Hall [Tickhill].....	·85	— ·64	·60	15	11	52·0	1	23·0	11	12	...
VIII.		Manchester(PlymouthGrove)	·30	— 1·75	·15	15	6	51·0	1	27·0	5, 6*d*	13	19
IX.		Wetherby (Ribston Hall) ...	1·13	— ·45	·72	16	6	...	...	...	...	...	...
,,		Skipton (Arncliffe)	1·15	— 3·54	·47	15	11	51·0	1	29·0	9	...	...
,,		Hull (People's Park)	1·29	— ·51	·65	15	11	...	...	...	...	...	...
X.		North Shields	1·51	+ ·18	·60	15	13	54·0	1	28·0	6, 14	7	12
,,		Borrowdale (Seathwaite).....	3·74	— 8·89	1·74	1	9	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	·62	— 2·57	·23	19	8	...	...	...	...	...	...
,,		Haverfordwest	1·50	— 2·62	·80	16	7	49·5	25	23·9	6	14	22
,,		Plinlimmon (Cwmsymlog) ...	·68	...	·33	19	5	...	...	...	...	...	...
,,		Llandudno.....	1·13	— ·79	·32	15	5	49·1	1	29·0	13	...	...
XII.	SCOTLAND.	Cargen [Dumfries]	1·00	— 2·65	·44	1	5	50·8	25	23·6	9	13	...
,,		Jedburgh (Sunnyside).....	·80	— ·71	·38	15	6	50·0	23	20·0	9	16	...
XIV.		Old Cumnock	1·05	— 2·45	·47	1	8	51·0	23	18·0	27	20	...
XV.		Lochgilphead (Kilmory).....	1·23	— 3·96	·40	1	10	...	...	...	...	...	...
,,		Oban (Craigvarren)	·90	...	·31	1	11	52·2	24	29·0	28	2	...
,,		Mull (Quinish).....	1·05	— 4·42	·23	1	10	...	...	...	...	...	...
XVI.		Loch Leven Sluices	1·10	— 1·65	·60	16	4	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	1·35	— ·75	1·00	15	4	51·6	24	25·9	8	16	...
XVII.		Braemar	1·38	— 1·98	·51	15	9	49·5	25	11·8	15	22	26
,,		Aberdeen (Cranford)	1·01	...	·48	15	14	52·0	3, 23	28·0	14	9	...
XVIII		Strome Ferry.....	1·30	— 4·43	·40	28	8	...	...	...	...	...	...
,,		Culloden	·53	— 1·31	...	...	..	52·0	23	23·0	15	10	24
XIX.		Dunrobin	1·45	— ·64	·48	15	6	55·0	23	27·8	8, 15	11	...
,,		S. Ronaldsay (Roeberry).....	1·37	— 1·27	·29	15	18	48·0	23	29·0	27*e*	3	...
XX.	IRELAND.	Cork (Blackrock).....	2·56	— 2·51	·69	12	12	55·0	20	27·0	5	9	...
,,		Dromore Castle	3·39	— 2·26	1·00	12	12	55·0	22	30·0	4	...	...
,,		Waterford (Brook Lodge) ...		— ...	...	...	...	...	...	...	...	...	...
,,		O'Briensbridge (Ross)	..	...	...	...	...	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	1·21	— 1·87	·20	16*a*	11	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	·80	— 1·55	·28	16	7	52·5	1	27·9	16	5	18
XXII.		Ballinasloe	·68	— 2·09	·18	1, 16	12	50·0	22	23·0	8	17	...
XXIII		Waringstown	1·53	— ·92	·42	19	11	56·0	22	25·0	4	12	21
,,		Londonderry (Creggan Res.).	·76	— 2·28	·12	17	16	..	...	...	...	...	...
,,		Omagh (Edenfel)	1·04	— 1·65	·21	17	11	50·0	2	27·0	4	7	22

a And 17. *b* And 26. *c* And 27, 28. *d* And 27. *e* And 28

\+ Shows that the fall was above the average ; —that it was below it.

METEOROLOGICAL NOTES ON FEBRUARY, 1890.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—The early part of the month was marked by a beneficial change, the weather being fine and dry, with a lower temperature. This colder weather continued throughout the month, and ended with a mean temp. on grass of 11°·8.

ADDINGTON.—A very dry month. During 20 years a smaller quantity of R has been recorded in February only twice, namely, ·63 in. in 1886, and ·64 in. in 1887. Frost occurred on a good many days, but was not severe. On the mornings of the 21st and 22nd rather dense fog occurred, clearing off before midday. Winds easterly nearly all through the month.

BURY ST. EDMUNDS, WESTLEY.—The month was a dry one. The mildest day was the 1st, the coldest the 28th. N. and E. winds prevailed for 24 days.

LANGTON HERRING.—A very fine, dry, cold, month, presenting a striking contrast to January. The mean temp. at 9 a.m. was 3°·1 below the average. Only once in February did the temp. rise above 49°—in January 17 times. Wind from W. on 4 days, E. on 24 days. Solar halo on the 14th. Fog on 21st and 22nd.

BODMIN, FORE STREET.—A dry month, with cold winds from N.E. and and N.W., chiefly from E. and N.N.E. Hard frost on 28th, and freezing all day.

WOOLSTASTON.—A cold, dry month, with constant frost. S on 14th, 15th 19th and 28th. Mean temp. 35°·7. A very marked solar halo was observed in the afternoon of the 28th from about 4.40 to 5 p.m.; the prismatic tints were very bright, and the mock sun on either side well defined; the upper one was only faintly indicated, and the lower one (if any) was below the horizon. There was also a very fine lunar halo the same evening.

ORLETON.—A very dry, cold and dull month, with a prevailing wind from N.E. Frequent severe frosts at night, with much fog. The sun was generally obscured by clouds or fog, but there were a few bright days. The mean temp. of the month was 3°·7 below the average of 29 years. The ground was only once covered with S, on the morning of the 20th. The bar. was very high during the greater part of the month. On the 24th at 5 p.m. great darkness with yellow fog occurred for half-an-hour, and again at the same hour on the 26th, with dark, stormy clouds. A lunar halo occurred on the night of the 28th, followed by a little S.

MANCHESTER, PLYMOUTH GROVE.—Thick fog on 6th; wet mist and thick fog on the 22nd, 23rd and 24th. S and sleet on the 20th. Cold E. wind prevailed. Mean temp. 38°·3.

HULL.—The weather up to the 24th was generally fine, but with a great amount of cloud, from that date to the end of the month it was frequently squally with showers of R, H, or S.

WALES.

HAVERFORDWEST.—Showery and cold on 1st, from the 2nd to the 15th dry, fine, and frosty, with keen easterly wind; more like March than February. The weather changed rather suddenly on the 15th, and some heavy R occurred, followed by a return of cold, but somewhat broken weather, which continued to the end of the month. The temp. was below the average, and the number of fine days above the average. Prevailing winds E., S.E. and N.W.

SCOTLAND.

CARGEN.—The mean bar. pressure for the month (30·186 in.) was unusally high, and during the last 20 years has been exceeded only three times, viz., in

January, 1880, when it was 30·234 in.; in November, 1879, 30·291 in.; and in November, 1867, 30·189 in. The mean temp. of the month (37°·9) was 1°·7 below the average, and 4°·1 below that of January. E. winds prevailed on 20 days.

JEDBURGH.—The temperature was much lower than in January, with cold E., N., and N.E. winds. Vegetation has progressed little since January.

OBAN, CRAIGVARREN.—The month was quite exceptionally dry for February, and March winds commenced on the 11th and continued throughout with a cold spell at the end. Fruit and other trees commenced to leaf and spring flowers were in bloom.

CULLODEN.—The rainfall was very small. Many days were mild and very sunny and the frosts were moderate.

IRELAND.

CORK.—Generally cold with frequent showers to the 21st; thence fine and often bright, with chilly easterly winds. Mean temp. 41°·8, nearly 0°·5 below the average.

DUBLIN.—This month was remarkable for the contrast it afforded to January. S.E. and E. winds, quiet, chiefly fine weather, frequent fogs, and low temp. took the place of the blustering S.W. gales, heavy and frequent rains, and high unsteady temp. of the preceding month. The mean temp. was 3° below that of January. The month may be regarded as a favourable one, but the amount of cloud (7·2) was much in excess of the average (6·6), and the month was notable for its foggy character. The mean temp. was 41°·5, or 1°·2 below the average. S or sleet fell on 13th and 28th. H on 7th; fog on 10 days; high winds on 6 days; gale on 12th. Temp. in shade exceeded 50° on 2 days, and on 2 days did not rise above 40°.

OMAGH, EDENFEL.—A fine, generally dry, and seasonable month, with typical easterly winds prevailing on 20 days and with neither frost nor rain sufficient to intrerupt its excellent character for farming operations.

THE WEATHER PLANT—GREAT RAINFALL.

To the Editor of the Meteorological Magazine.

SIR,—I have seen in your last number that a weather plant has been fixed as weather prophet at the tourists' house on the Sonnblick (!) I was never able to ascertain if it performed, but I believe that the whole is nothing but humbug. I know nobody who can give me reliable information about it. The weather plant has lost all interest with us, and I hear nothing about it.

In the February number of the *Zeitschrift* you will find that at the station Hermsburg (about 3,000 ft. above sea level) in the south Krain, southern foot of the Krainer snow mountains, in the month of October 1889, 1450 mm. or 57·1 inches of rain fell. In one of our early numbers I shall report details about our new stations, where rain has been most plentiful. In South Dalmatia, Bocche di Cattaro we have a station, Crkvice, 3,445 ft. above sea level where in the year 1889, more than 5,000 mm. or 200 inches of rain fell, and yet the year has been pretty normal.

Yours very truly,

J. HANN.

Hohe Warte bei Wien, 22nd February, 1890.